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Hyon et al.

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(54) **ULTRA HIGH MOLECULAR WEIGHT
 POLYETHYLENE MOLDED ARTICLE FOR
 ARTIFICIAL JOINTS AND METHOD OF
 PREPARING THE SAME**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

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 522/161; 525/333.8**

(58) Field of Search **623/18, 16, 23.58;
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(56) **References Cited**

U.S. PATENT DOCUMENTS

3,886,056 * 5/1975 Kitamaru et al. 204/159.5
 4,224,696 * 9/1980 Murray et al. 623/20
 4,587,163 5/1986 Zachariades 428/292
 4,636,340 * 1/1987 Itaba et al. 522/161
 4,655,769 * 4/1987 Zachariades 623/1
 4,747,990 5/1988 Gaussens et al. 264/322
 5,030,402 7/1991 Zachariades 264/138

5,030,487 * 7/1991 Rosenzweig 428/34.9
 5,066,755 * 11/1991 Lemstra 522/161
 5,130,376 * 7/1992 Shih 525/309
 5,276,079 * 1/1994 Duan et al. 524/386
 5,358,529 * 10/1994 Davidson 623/20
 5,405,393 * 4/1995 Falkenstrom 623/18
 5,428,079 * 6/1995 Bastiaansen et al. 522/161
 5,728,748 * 3/1998 Sun et al. 522/161

FOREIGN PATENT DOCUMENTS

WO 95/06148 3/1995 (WO) .

OTHER PUBLICATIONS

Kitamura, R. et al., "Size and Orientation of Crystallites in Lightly Cross-linked Polyethylene, Crystallized from the Melt Under Uniaxial Compression", *Die Makromolekulare Chemie*, vol. 175, 1974, pp. 255-275.

Kitamura, R. et al., "The Properties of Transparent Film Made from Linear Polyethylene By Irradiation Cross-Linking", *Macromolecules*, vol. 6, 1973, pp. 337-343.

Kitamura, R. et al., Structure and Properties of Lightly Crosslinked Crystalline Polymers Crystallized or Processed under Molecular Orientation, *Journal of Polymer Science: Macromolecular Reviews*, vol. 14, 1979, pp. 207-264.

* cited by examiner

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(57) **ABSTRACT**

An ultra high molecular weight polyethylene molded article for artificial joints has molecular orientation or crystal orientation in the molded article, and is low in friction and is superior in abrasion resistance, and therefore is available as components for artificial joints. Further, the ultra high molecular weight polyethylene molded article for artificial joints can be used as a component for artificial hip joints (artificial acetabular cup), a component for artificial knee joints (artificial tibial insert) and the socket for artificial elbow joints, and in addition to the medical use, it can be applied as materials for various industries by utilizing the characteristics such as low friction and superior abrasion resistance.

11 Claims, No Drawings